REMARKS

This Amendment After Final Rejection accompanies Applicants' concurrently filed Request for Continued Examination in the above-identified application and is deemed to constitute the required submission under 37 CFR 1.114.

Claims 1-58 now have been canceled, without prejudice, and New Claims 59-66 have been substituted therefor.

In the currently outstanding Final Official Action, the Examiner has rejected all of the claims then present in this application that were not withdrawn prior to his action. The drawings as filed on 24 March 2005 were accepted. Furthermore, Applicants' claim for foreign priority and the receipt of the requiered copies of the priority documents were acknowledged. In addition, Applicants' Information Disclosure Statements of 24 March 2005 and 22 June 2005 were acknowledged.

Also, then pending Claims 11, 42-46 and 48-50 were rejected under 35 USC 102(b) as being anticipated by the Shimoda reference. Further, Claims 1-6, 8-11, 41-46 and 48-50 were rejected under 35 USC 103(a) as being unpatentable over Shimoda in view of Higashino in view of Chang in view of Hawkins in view of Seki. Furthermore, the Examiner indicated that the feature that "droplets are dried immediately after landed on an organic EL layer formation region on a substrate, preventing movement of the droplets landed on another droplet previously landed are not recited in the rejected claims. The new claims submitted herewith remove this deficiency in the previously pending claims and also restate the subject matter of the present application in what is believed to be a clearer and more definite form that overcomes the Examiner's currently outstanding rejections.

The claims of this application as they will stand upon the entry of the foregoing Amendment are reproduced hereinabove in association with respectively appropriate status identifiers as required by the Rules.

The bases for the New Claims 59-66 submitted herewith in the originally filed specification of this application are as follows:

With respect to Claims 59 and 63, Applicants respectfully submit that those claims are supported in the originally filed specification as follows:

-The recitation of "forming a first electrode on the substrate" is supported in the originally filed specification at page 91, lines 16-17.

- The recitation of "forming a barrier on the first electrode, between pixels having different colors, the barrier being provided for obtaining a clear contrast of the pixels adjacent to each other" is supported by the specification as originally filed at page 92, lines 19-21 and page 93, lines 6-8.

- Of the recitation of "forming a light emitting layer"
  - the rcitation of "a nozzle of an inkjet apparatus..., the nozzle having a nozzle diameter from Φ0.2 μm to Φ4 μm" is supported by the specification as originally filed at page 107, lines 14-20.
  - the recitation of "droplets of light emitting material... the droplets having a viscosity of 20 cPs or more and are 1 pl or less in amount" is supported by the specification as originally filed in Claims 1 and 3
  - the recitation of "ejecting ... while an electric field is generated between an electrode of the nozzle and a counter electrode positioned so as to face the electrode" is supported in the originally filed specification at page 62, lines 8-19

Furthermore, the recitation of "forming a second electrode on the light emitting layer" is supported in the originally filed specification at page 91, lines 17-18. The recitation of "in step (c), the barrier being formed so as to have a height lower than the light emitting layer" is supported in the specification as originally filed at page 93, lines 8-11. The recitation of "in step (d), the droplets ejected from the inkjet being ejected in plural times while shifting landing positions of the droplets in the light emitting layer forming region so that the droplets overlap to form two or more layers, in order to attain a smooth surface of the light emitting layer" is supported by the specification as originally filed at page 98, lines 9-13.

The recitation of "forming the wiring on the first electrode, between pixels having different colors" is supported by the specification as originally filed at page 79, lines 20-24.

With respect to Claims 60 and 64, Applicants respectfully submit that those claims are supported in the originally filed specification at page 71, line 25 to page 72, line 18.

With respect to Claims 61 and 65, Applicants respectfully submit that those claims are supported in the originally filed specification at Page 98, lines 14-18.

With respect to Claims 62 and 66, Applicants respectfully submit that those claims are supported in the originally filed specification at page 93, lines 16-22 and at page 104, lines 15-17.

Hence, Applicants respectfully submit that new claims 59-65 are fully supported by the specification as originally filed and do not introduce any so-called new matter into the above-identified application.

Applicants respectfully call the Examiner's attention to the fact that the present claims are directed to a method of making (forming) a display element, and further that contrary to his latest assertions, how the inkjet device ejects the ink, whether the nozzle is smaller than the drop size, the volume of the drops, the volumetric concentration of the drops and the viscosity of the ejected drops all are factors that produce structural changes in the produced device as demonstrated by the following description of the effects achievable by the currently claimed methods. Thus, contrary to the Examiner's assertion with respect to the previous claims of this application, Applicants respectfully submit that the present claims define methods that produce structures different that those of the active matrix EL displays produced using the Shimoda et al method, and that those methods are distict and patentable over the Shimoda reference.

EFFECTS OF THE PRESENT INVENTION

Thus it will be seen that the effects of the present invention are as described in the following comments.

With respect to new Claims 59 and 63, the present application forms "(forming) a light emitting layer by ejecting droplets of light emitting material from a nozzle of an inkjet apparatus..., the droplets having a viscosity of 20 cPs or more and are 1 pl in amount, the nozzle having a nozzle diameter from Φ0.2 μm to Φ4 μm". That is to say that in the present invention it is possible to eject "droplets of light emitting material having a viscosity of 20 cPs or more and are 1 pl or less in amount". Applicants respectfully submit that his is difficult to carry out in a conventional technique (see present specification at page 99, lines 19-25) and hence is neither anticipated nor rendered obvious by the art relied upon by the Examiner.

Also, in the inventions of Claims 59 and 63, an amount of one droplet is not more than 1pl. Accordingly, the droplet dries immediately upon landing. Therefore, it is difficult for the droplet to move after landing on the substrate, thereby making it possible to form a light emitting layer with accurate positioning. This arrangement prevents movement of the droplets that are landed on another droplet previously landed, in cases where a plurality of droplets are ejected so as to form one light emitting layer having a desired thickness by having the droplets land overlapping each other (see page 30, line 4 to page 32, line 9 of the present specification).

Furthermore, droplets having a high concentration with a viscosity of 20 cPs or more are ejected. This allows a reduction in the number of layers to be made with the plurality of droplets. As a result, the number of ejected droplets can be reduced, thereby improving productivity. (see page 36, line 24 to page 37, line 3 of the present specification).

Moreover, the droplets do not move after landing. This allows the feature of "in step (c), the barrier is formed so as to have a height lower than that of the light emitting layer". This also improves productivity.

Still further, "in step (d), the droplets ejected from the inkjet apparatus being ejected in plural times while shifting landing positions of the droplets in the light emitting layer forming region so that the droplets overlap to form two or more layers in order to attain a smooth surface of the light emitting layer". In this way sufficient smoothness of a surface is attained for the light emitting layer.

Turning now to the inventions of Claims 60 and 64, "the nozzle has a droplet ejection opening on its end, the opening having a diameter smaller than a diameter of each of the droplets immediately after being ejected, so that a region in which the electric charge is concentrated is substantially equal to a region of a meniscus". Therefore, it is possible to significantly reduce the voltage applied to the nozzle electrode and to remarkably increase the electric field of the meniscus (see page 71, line 25 to page 72, line 18 of the present specification).

In inventions of Claims 61 and 65, on the other hand, "the droplets ejected from the inkjet apparatus are targeted in such a manner that a center of a landing position of each of the droplets landed as an upper layer is positioned in the middle of centers of two adjacent landing positions of the droplets landed as a lower layer". Hence, the surface of the light emitting material layer is allowed to be sufficiently smooth (see Page 98, lines 16-18 of the present specification as originally filed).

Finally, in the inventions of Claims 62 and 66, the barrier functions as the black matrix of the display element. Thus it is not necessary to separately provide a black matrix (see page 104, lines 15-17 of the specification of this application as originally filed).

In further response to the Examiner's substantive rejections Applicants hereby repeat and re-emphasize the following comments indicative of the patentable nature of the claims of this application as hereinabove amended.

Applicant respectfully submits that it will be understood by the Examiner that in the method for manufacturing an organic EL display element, with the inkjet method, it is possible to form layers for three primary colors R, G, and B simultaneously. This prevents the organic EL element from being damaged by the repeating photolithography process, and allows reduction of a production time.

Further, since the ink is only applied to a position of the color pixel, an amount of the pigment used becomes less than the amount used in the photolithography method. Thus, it is possible to realize a remarkable reduction of the material cost. Further, since it is not necessary to carry out the complicated exposure and development, a developing apparatus becomes no longer necessary. Therefore, the manufacturing cost is reduced. Moreover, since it is possible to work under a normal temperature and a normal pressure, the inkjet method appears to be more promising in improving a productivity, and in simplifying the productive facility" (see page 5, line 18-page 6, line 9 of the English specification).

However, "in the conventional inkjet method, there has not been carried out a sufficient study on how to dry the droplets ejected from a nozzle. Thus, it is known that droplets do not immediately dry after landing on a substrate. This results in a greater amount of non-dried droplets on the substrate in order to obtain a desirable layer thickness of the organic EL layer. As a result, it takes long time for drying the droplets, thereby allowing the droplets to move on the substrate before the droplets dry. This deteriorates a formation accuracy of the organic EL layer" (see page 6, lines 13-22 of the English specification).

"Reduction of the diameter of the single droplet is an option to avoid the foregoing problem" (see page 8, lines :13 and 14 of the English specification).

In this case, "the droplet 314 needs to be ejected toward the same pixel twice or more. However, after a first droplet, successive droplets land on the organic EL layer formed by a previously landed droplet. Since the organic EL layer formed by the previously landed droplet is not subjected to the liquid-affinity treatment, the successive droplets do not spread out in a desirable shape. This causes an unevenness. Further, if the successive droplets land before the previous droplet dries, the ink will spread out to the liquid-affinitive region 312 of the next pixel. Therefore, ejection of the successive droplets must be suspended until the previous droplet 314 dries.

This results in a poor productivity, Further, it is necessary to carry out the photolithography process for forming the liquid-affinitive region and the liquid-repellent region. This does not allow the inkjet apparatus to contribute to simplification of the productive facility advantageously" (see page 8, line 24-page 9, line 16 of the English specification).

Further, also in formation of black matrices (BM) in an organic EL display, "one option is to increase concentration of the droplet 314, and eject the droplets 314 at sufficiently long intervals, so that the solvent of the previous droplets is dried off by the time a final droplet is landed. However, the higher the concentration of the droplet becomes, the higher viscosity the ink has so as to be unable to be ejected by using a conventional inkjet method. Further, it is necessary to carry out the photolithography process for forming the BM. Therefore, the inkjet apparatus is not allowed to contribute to simplification of the productive facility advantageously" (see page 11, line 24-page 12, line 9 of the English specification).

In order to solve the foregoing problem, the inventors of the present application have diligently studied formation of an organic EL layer based on an inkjet method that allows easy production with simple equipment and low costs, in a method for manufacturing an active matrix organic EL display element using an electrostatic attraction type inkjet apparatus.

An object of the study is to prevent deterioration of a formation accuracy of the organic EL layer when forming one organic EL layer with a desired thickness by ejecting droplets and laminating the droplets.

As a result of the study, the inventors have found that deterioration of a formation accuracy of the organic EL layer when forming one organic EL layer with a desired thickness by ejecting droplets and laminating the droplets can be prevented by arranging such that the droplets are dried immediately after landed on an organic EL layer formation region on a substrate, preventing movement of the droplets landed on another droplet having previously landed. Further, the inventors have found that in order to dry the droplets immediately after landed on the organic EL layer formation region on the substrate, it is requested that each of the droplets ejected via the nozzle of the inkjet apparatus is 1 pl or less.

As described above, when each of the droplets ejected via, the nozzle of the electrostatic attraction type inkjet apparatus is 1pl or less, it is possible to attain a high speed of drying the droplets, high accuracy in landing the droplets, easiness in ejecting the droplets, and large number of landed droplets (high productivity). This is evident from Table 3 on page 75 of the English specification.

None of the cited references disclose the object of the present application of arranging such that the droplets are immediately dried after landed on the organic EL layer formation region on the substrate in order to prevent deterioration of a formation accuracy of the organic EL layer when forming one organic EL layer by ejecting droplets successively. Further, none of the cited references disclose arranging such. that each of the droplets ejected via the nozzle of the inkjet apparatus is 1pl or less in order to attain the object.

Specifically, Shimoda only discloses use of an inkjet apparatus in order to deposit an organic light emitting layer. Higashino only discloses changing a voltage applied on an electrode in an electrostatic attraction type inkjet head so as to control the size of droplets of ink or the volume of the ink that is ejected from the inkjet head.

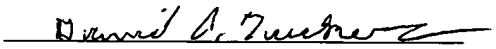
Chang only discloses reducing the volume of droplets ejected from an inkjet apparatus in order to increase resolution of an image to be formed. Needless to say, Chang does not disclose successively ejecting droplets from a nozzle so as to repeat ejection of the droplets onto the same organic EL layer formation region. Hawkins only discloses that in an inkjet apparatus, the size of a nozzle is a result effective variable for determining the flow of ink through the nozzle and thus the droplet size.

As described above, the cited references disclose neither the object to be solved by the present invention nor the feature of the present invention that each of the droplets ejected from the nozzle of the inkjet apparatus is 1pl or less. Therefore, the subject matter of the present invention cannot be obtained by any combination of the cited references, and cannot be easily arrived at by any combination of the cited references.

Still further, Applicants believe that additional fees beyond those submitted herewith are not required in connection with the consideration of this response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. **04-1105**, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

Date: November 9, 2009



SIGNATURE OF PRACTITIONER

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